Contraception Method Type by Self-Reported HIV Status among Women in Malawi

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Abstract

Objectives: This analysis aims to determine 1) which methods of contraception are used by women in Malawi; 2) whether the methods differ by self-reported HIV status; and 3) whether frequency of condom use at last sex differs by self-reported HIV status.

Methods: The analysis is based on 13,618 non-pregnant women aged 15-49 in the 2010 Malawi Demographic and Health Survey who had sexual debut and reported the result of their last HIV test. We accounted for the 2-stage cluster sampling design by applying cluster, stratum, and sample weights. Current contraceptive method analysis was restricted to the subgroup with contraceptive need (i.e., fecund women who did not want a pregnancy in next 12 months). Differences in use between HIV-positive and HIV-negative women were assessed with chi-squared tests of significance.

Results: The proportion reporting condom use at last sex was statistically significantly higher in HIV-positive women (34.5%, standard error (s.e.)=2.2) than HIV-negative women (8.5%, s.e.=2.2, $p<.01$). Among women with contraceptive need (N=12,658; 93.1%), use of long-acting reversible contraception (LARC) was low and did not differ between HIV-positive (1.4%, s.e.=0.44) and HIV-negative women (1.9%, s.e.=0.19, $p=0.35$). HIV-negative women (30.4%, s.e.=0.64) were more likely than HIV-positive women (15.6%, s.e.=1.4, $p<.01$) to use progestin-only injections. Utilization of female sterilization was higher in HIV-positive women (17.9%, s.e.=1.8) than in HIV-negative women (9.2%, s.e.=0.38, $p<.01$).

Conclusions: LARC use was low among women in Malawi. Female sterilization was higher than in many other countries in sub-Saharan Africa. Targeted interventions to promote contraception are urgently needed to prevent mother-to-child transmission of HIV in Malawi.

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Introduction

Women who are infected with HIV risk transmitting the virus to their children when pregnant or breastfeeding. The World Health Organization (WHO) and the United Nations (UN) recommend a four-pronged approach to prevent mother-to-child transmission (MTCT) of HIV, consisting of 1) primary prevention of HIV infection, 2) preventing unintended pregnancies among HIV-infected women, 3) preventing HIV transmission from HIV-infected women to their fetuses during pregnancy and to their neonates after delivery, and 4) providing HIV care for HIV-infected mothers and their infants.[1] Unfortunately, preventative mother-to-child transmission (PMTCT) programs are often designed to address only the third aspect of the approach by promoting the use of antiretroviral (ARV) prophylaxis to women who are pregnant or breastfeeding.[1]

In sub-Saharan Africa, a region that produces 90% of the 800,000 incident cases of children with HIV each year, MTCT is responsible for a portion of the HIV disease burden.[2] ARV prophylactic interventions require access to consistent prenatal and delivery care and breastfeeding alternatives, which may be unachievable for women in this region.[2] Additionally, these interventions cannot benefit women who are HIV-positive but unaware of their status. Success of an ARV regimen depends on a series of progressive steps (Figure). Each part of the intervention has the potential for failure.

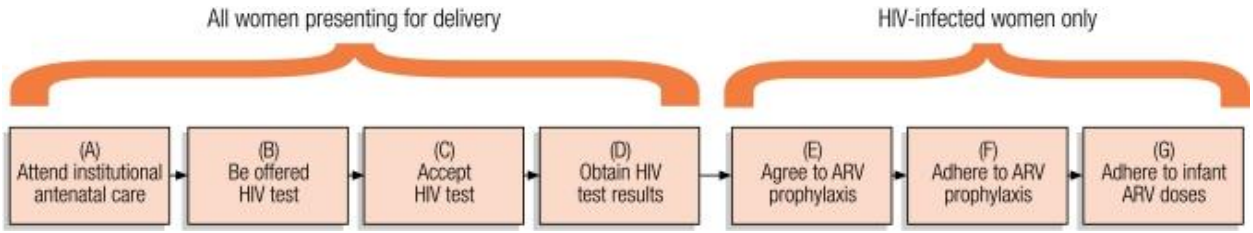

Figure 1: Series of events required for a pregnant woman to successfully receive full ARV prophylaxis (Stringer et al., 2008)

The second prong of the WHO/UN approach aims to prevent unintended pregnancies in HIV-positive women. Proper use of contraception to prevent unintended pregnancies can prevent vertical transmission of HIV.[3] With use of highly effective contraception, an HIV-positive woman can prevent unintended pregnancy for as long as she desires. This may be for the rest of her life, or until the timing is appropriate for her to access other PMTCT services. Additionally, the use of contraception as a means of preventing MTCT is more cost effective than the use of other PMTCT services. When compared with the cost of other PMTCT services in President's Emergency Plan for AIDS Relief countries, the yearly minimum cost savings of using family planning interventions (including the cost of outreach visits, methods, and services) to prevent undesired HIV-positive births versus using other PMTCT interventions (including the cost of training clinicians, HIV testing and counseling, and completed nevirapine doses for infants and mothers) ranged from $26,000 in Vietnam to $2.2 million in South Africa. The current prevalence of contraception use has prevented nearly 175,000 unplanned births to HIV-positive mothers in sub-Saharan Africa alone.[3]

Malawi is a landlocked country in sub-Saharan Africa bordered by Mozambique, Tanzania, and Zambia.[4] Its total fertility rate (TFR) is the eighth highest globally at 5.6 children per woman, and adult prevalence of HIV is 10.04%.[4] Malawi accounts for 4% of the HIV burden in sub-Saharan Africa.[5] Though rigorous efforts have reduced HIV prevalence in recent years,

46,000 people still acquire HIV annually in Malawi.[6] Malawi's high HIV prevalence and incidence, combined with its high TFR, have the potential to result in a high prevalence of MTCT if not combatted with appropriate interventions. Estimates of contraception use in Malawi can be used as the first step in designing MTCT interventions that prevent unintended pregnancies in HIV-positive women. This study aims to determine which methods of contraception are used by women in Malawi and whether the methods differ by self-reported HIV status using data from the 2010 Malawi Demographic and Health Survey (MDHS). I describe all methods of contraception, but focus specifically on the use of long-acting reversible contraception (LARC), progestin-only injections, and female sterilization. These methods are highly effective for contraception and have the potential to prevent unintended pregnancies in HIV-positive women if used properly. Progestin-only injections are the most popular method of contraception in Malawi,[7] with injectable depot medroxyprogesterone acetate (DMPA) being the most widely used type. This method requires a subdermal injection every three months. Female sterilization is also a frequently utilized method of contraception in Malawi.[7] Female sterilization is useful to women who want to limit childbearing, as it is a highly effective, irreversible method of contraception involving removal, cutting, sealing, or tying fallopian tubes.

In addition to current method of contraception use, I aim to measure frequency of condom use at last sex, and determine whether the frequencies differ by self-reported HIV status. Condoms are the only barrier contraceptive method that can be used to prevent horizontal disease transmission. The 2010 MDHS provides a variable separate from the variable describing current contraceptive use that measures whether a woman used a condom the last time she had sexual intercourse. This is a better indicator of condom use than simply asking a woman if she uses condoms as her current method of contraception because she may be using another form of

contraception to prevent pregnancy, while simultaneously using condoms to prevent disease transmission.

Literature Review

When used perfectly, most modern contraceptive methods are effective against unintended pregnancies. However, patterns of typical use often differ greatly from perfect use. LARC methods include intrauterine devices (IUD) and subdermal implants.[8] These methods require a one-time insertion by a healthcare provider and are effective at preventing pregnancy for 3 to 10 years, depending on the specific device.[8] "Typical" use of contraception describes the average effectiveness of a contraceptive method for a person who uses it inconsistently or incorrectly.[9] "Perfect" use of contraception shows how effective a method is when directions for use are followed exactly. For most methods of contraception, failure rates of typical use and perfect use differ. However, LARCs are not user-dependent, and unintended pregnancy rates during the first year of use when used perfectly and when used typically are identical (0.2% for IUDs, 0.05% for subdermal implants).[9] Therefore, LARC methods have the most potential of all reversible methods of contraception to prevent unintended pregnancies, including in HIV-positive women.

Few studies have focused on the prevalence of LARC use in Malawi, but many have shown that LARCs are underutilized in other sub-Saharan African countries.[10] The reasons behind this underutilization in Africa vary. Some medical providers may believe that IUDs are associated with immorality or cause infertility or disease, including pelvic inflammatory disease.[10] Additionally, the emergency contraceptive capabilities of the copper IUD have convinced some clinicians that the IUD functions as an abortifacient. Physiological barriers may also prevent widespread IUD utilization because some providers will insert them in a patient

only during or directly after menstruation in order to be certain that a woman is not pregnant. Additionally, some clinicians mistakenly[11] believe that IUDs are not appropriate for use in nulliparous women. Provider training on IUD placement may be limited in some settings.[10] Finally, acceptor barriers to IUD utilization often relate to the fear of experiencing pain and discomfort during insertion and afterward, especially in nulliparous women.

Nationally representative surveys of clinicians conducted in South Africa and Zimbabwe showed that only 18% of clinical providers offered any type of IUD, and just 16% provided subdermal implants.[12] Healthcare providers had overly restrictive ideas of which patients were eligible for LARC use, with just 5% and 15% saying that IUDs and implants (respectively) were appropriate for use in HIV-positive women or women at risk for HIV. Despite this, 82% of clinicians surveyed suggested that patients were not utilizing IUDs enough and ≥ 50% wanted more training regarding LARC use.

Another barrier to LARC uptake in Malawi may relate to the cost of the devices. Many women in Malawi access family planning services through mobile outreach services, because 81% of the population lives in rural areas were access to health clinics is often impossible.[13] While short-acting contraceptive methods are supplied for free by the Family Planning Association of Malawi in mobile outreach settings, LARC methods usually come with a price. However, in these settings, the cost of LARCs are determined with a sliding scale, and most women are able to purchase a LARC for 40-50% less than the cost at a traditional clinic.

Regardless of these setbacks inhibiting LARC utilization, interest, desire, and eligibility to begin using LARCs is high among HIV-positive women in Malawi.[14] A clinical trial conducted in Malawi's capital, Lilongwe, found that of 281 HIV-positive women using ART, 97.2% and 98.2% were eligible for IUD or implant insertion, respectively. After educational

information, when asked about their preference of contraceptive method, 34.9% of the women selected an IUD as their preferred method of contraception when asked to choose between combined hormonal contraceptives, progestin-only pills, DMPA, implants, and copper IUDs. However, when women were asked in a separate question if they would be willing to have an IUD inserted on the day of their visit, 79.0% agreed. Of the 21% who declined IUD insertion at that time, 37.3% said that they would like to have one in the future. These results suggest that LARC acceptability may be high among women who are HIV-positive in Malawi, and promoting it as a means of MTCT prevention may be worthwhile. Many barriers to LARC utilization appear to be effectively mitigated with proper education of both providers and patients.[14]

This analysis uses self-reported HIV status, as opposed to laboratory-confirmed HIV test results, to measure HIV status. Of all DHS data, self-reported HIV status is a variable assessed in only the 2010 Malawi and the 2011 Uganda AIDS indicator survey. HIV testing of respondents is standard procedure in Malawi, and the laboratory HIV test results of those who consented are available in a separate dataset. If HIV status is a predictor of contraceptive use, it is only relevant to use the status that women believe themselves to be, as opposed to the laboratory results, which they may not be aware of.

Methods

I. Participants

Data from the 2010 MDHS were used to conduct all analyses. The DHSs are nationally representative, cross-sectional household surveys conducted regularly in select low- and middle-income countries under the direction of the Joint United Nations Programme on HIV/AIDS. Data from the 2010 MDHS was gathered by the National Statistical Office and the Ministry of Health

Community Services Unit.[15] The 2010 MDHS used a two-stage cluster sampling design to select respondents. Malawi consists of 28 administrative districts, and the 2008 Malawi Population and Housing Census was first used to divide these districts into 849 clusters. There were 158 clusters in urban areas and 691 in rural areas. The distribution of clusters among the 28 districts was not determined by proportionality to the national population, because areas with low populations would not be comprised of enough clusters for adequate representation. Therefore, districts with low populations were oversampled. The second stage of sampling was based upon households. To provide an accurate depiction of survey indicators, at least 950 households were sampled per district. Overall, 25,311 households were selected and eligible for participation in the 2010 MDHS.

The 2010 MDHS data are gathered in Woman's, Man's, and Household questionnaires.[15] The present analysis used data only from the Woman's MDHS questionnaire. Respondents were interviewed about various topics using scripted questionnaires. A total of 24,825 households were successfully sampled, yielding a 98% response. MDHS staff identified 23,748 women aged 15-49 as being eligible for inclusion, and 97% were successfully interviewed. A total of 23,020 women's responses were recorded in the 2010 MDHS. The present study limited its analysis population to women who were not pregnant, had ever had sexual intercourse, and reported the result of their last HIV test. Women who were pregnant or had never had sexual intercourse were excluded because they were not considered to be possibly using contraception as a means of MTCT prevention.

II. Measures

The objectives of this study were to 1) identify the current methods of contraception used by women in Malawi; 2) determine whether the methods varied by self-reported HIV status; and

3) determine whether condom use at last sex varied by self-reported HIV status. HIV status was determined by each respondent's answer to "Could you please tell me what was the result of your last test for the AIDS virus?" To determine if the frequency of condom use at last time of sexual intercourse varied by HIV status, responses were dichotomized based on each woman's response to "Did you use a condom the last time you had sexual intercourse?" Response categories included yes or no. Note that condom use at last sex is a separate variable from current method of contraception use, so the analysis population for these two variables differs because they answer different questions. The analysis population used for describing the current method of contraception was limited to women who had a need for contraception. I created a derived dichotomous variable for contraceptive need. Women were considered to have contraceptive need if they were fecund and did not want a pregnancy in the next twelve months. A woman was considered fecund if she was not classified as "declared infecund" in response to the question assessing desire for more children.

Women using contraception at the time of survey indicated their current method from the following list: female sterilization, male sterilization, oral contraceptive pill, intrauterine device (IUD), progestin-only injectables, subdermal implants, male condoms, female condoms, periodic abstinence/rhythm, withdrawal, or other folk method. If a respondent reported using multiple methods, the highest ranked method was recorded (methods are listed in descending order).

Four derived, dichotomous variables were created to further analyze contraceptive methods used by women who had contraceptive need. The first variable described whether a respondent was using a modern contraceptive method. Modern methods of contraception, according to the World Health Organization, include female sterilization, male sterilization, the pill, IUD, injectables, implants, male condoms, and female condoms.[16] The 2010 MDHS

provides a derived variable that categorizes current method used as no method, folkloric, traditional, or modern. The no method, folkloric, and traditional categories were combined, leaving the previously mentioned modern methods to define the "yes" category and rhythm, withdrawal, other folk methods, and use of no method as the "no" response. In addition to modern contraceptive method use, three dichotomous variables were created to describe whether or not a respondent was currently using each of the following methods: 1) LARCs; 2) progestin-only injections; or 3) female sterilization.

III. Analysis

SAS (Statistical Analysis System; version 9.4; SAS Institute; Cary, NC), was used for all analyses. Because the MDHS used a complex, 2-stage cluster sampling design, the present analysis used survey, strata, and cluster weights to adjust for the differences in probability of selection. I used chi-squared tests of significance to test for differences by self-reported HIV status among all variables.

I used logistic regression to determine, in separate analyses, whether the following differed by HIV status: 1) progestin-only injection use; 2) female sterilization use; 2) condom use at last sex. The latter two analyses were limited to women with contraceptive need. Odds ratios were not calculated for LARC use because of insufficient data—only a very small percentage of women were using a LARC method overall and within HIV-positive and HIV-negative groupings. The analyses were adjusted for the following confounders: age, wealth quintile, type of place of residence (urban/rural), gravidity, and union status based on previous literature. I report adjusted odds ratios (aORs) with 95% confidence intervals (CIs) for differences by HIV status for the three outcomes of interest.

Results

Of the 23,020 women sampled in the 2010 MDHS, exclusions were applied to limit the analysis population (Figure 2). Women who had not reached sexual debut were excluded, leaving 19,880 women. Following this, pregnant women were excluded, resulting in 17,718 women. Finally, those who had not reported the result of their last HIV test were excluded, resulting in a total of 13,618 women to comprise the final analysis population. Responses of "undetermined" or "refused to answer" to the HIV test result question were combined, producing a negligible 1.37%. These responses were set to missing data, and a dichotomous variable containing "positive" and "negative" responses was created.

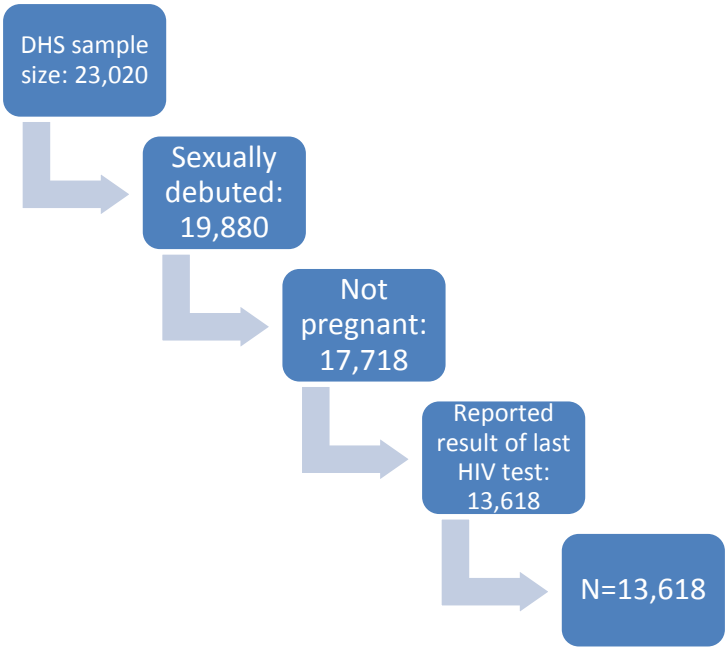

Figure 2: Exclusions applied to analysis population

This analysis population was used to analyze all demographic variables. After further excluding women who did not have contraceptive need at the time of survey, 12,658 women remained, and this number served as the analysis population for contraceptive variables.

Among the analysis population of 13,618 women (Table 1), the mean age of respondents was 30 years and most lived in a rural area (80.1%, s.e.=0.92). About two-thirds (68.4%, s.e.=0.69) were married, with 5.6% (s.e.=0.28) reporting never having been married, and 25.7% (s.e.=0.63) living with partner, not living with partner, widowed, or divorced. Most women were Christian (86.1%, s.e.=0.76), followed by Muslim (13.0%, s.e.=0.76), and 0.8% (s.e.=0.13) reporting no religion. The median number of children ever born was four. Most women reported that their husband was residing in their home (86.3%, s.e.=0.54) and 60.2% (s.e.=0.73) said they were currently working. A total of 987 (7.2%, s.e.=0.33) of respondents reported being HIV-positive.

Of the 13,618 women in the overall analysis population (not restricted by contraceptive need), the proportion of women who reported using a condom use at last sex was statistically significantly higher among HIV-positive women (34.5%, s.e.=2.2) than HIV-negative women (8.5%, s.e.=2.2, p<.01). Despite this, overall condom use at last sex was low, with only 10.0% (s.e.=0.41) of women reporting having used a condom the last time they had sexual intercourse.

Table 1. Demographic characteristics of sexually debuted, non-pregnant women in Malawi, 2010

			Self-Reported HIV Status				
	Total (N=13,618)		**HIV Positive (N=987)**		**HIV Negative (N=12,631)**		**P-value**
	Unweighted No.	**Weighted (%)**	**Unweighted No.**	**Weighted (%)**	**Unweighted No.**	**Weighted (%)**	
Age							
15-25	4,842	(36.5)	101	(10,1)	4,741	(38.5)	<.01
26-32	4,053	(30.1)	280	(29.3)	3,773	(30.1)	
33-49	4,723	(33.5)	606	(60.5)	4,117	(31.4)	

Wealth Quintile							
Poorest	2,620	(17.8)	188	(17.1)	2,432	(17.9)	0.02
Poorer	2,653	(18.4)	176	(15.8)	2,477	(18.6)	
Middle	2,789	(19.5)	180	(16.8)	2,609	(19.7)	
Richer	2,832	(20.2)	227	(24.0)	2,605	(19.9)	
Richest	2,724	(24.1)	216	(26.3)	2,508	(23.9)	
Region							
Northern	2,564	(12.1)	99	(6.7)	2,465	(12.4)	<.01
Central	4,328	(40.6)	198	(27.3)	4,130	(41.7)	
Southern	6,726	(47.3)	690	(66.0)	6,036	(45.9)	
Type of residence							
Urban	1,909	(19.9)	195	(25.4)	1,714	(19.5)	<.01
Rural	11,709	(80.1)	792	(74.6)	10,917	(80.6)	
Highest education							
None	2,073	(15.4)	194	(20.0)	1,879	(15.0)	<.01
Primary	8,934	(63.6)	644	(63.4)	8,290	(63.6)	
Secondary or more	2,611	(21.0)	149	(16.6)	2,462	(21.3)	
Union status							
Never married	797	(5.6)	10	(1.1)	787	(6.2)	<.01
Married	9,308	(68.4)	475	(49.1)	8,833	(69.9)	
Living together, widowed, divorced, not living together	3,513	(25.7)	502	(49.7)	3,011	(23.9)	
Religion							
Christian	12,006	(86.1)	882	(86.4)	11,124	(86.1)	0.93
Muslim	1,501	(13.0)	97	(12.9)	1,404	(13.0)	
None	83	(0.8)	8	(0.7)	75	(0.8)	

Number of children ever born							
0	4,562	(5.5)	32	(3.3)	698	(5.6)	<.01
Less than 4, more than 0	8,326	(62.9)	546	(56.8)	7,780	(63.4)	
4 or more	730	(31.7)	409	(39.9)	4,153	(31.0)	
Husband lives in home							
Yes	9,117	(86.3)	455	(84.7)	8,662	(86.4)	0.40
No	1,467	(13.7)	80	(15.3)	1,387	(13.6)	
Currently working							
Yes	8,360	(60.2)	673	(65.1)	7,687	(59.9)	0.02
No	5,234	(39.8)	312	(34.9)	4,922	(40.1)	
Used condom at last sex							
Yes	1,174	(10.0)	234	(34.5)	940	(8.5)	<.01
No	10,399	(90.0)	439	(65.5)	9,960	(91.5)	
Need for Contraception[1]							
Yes	12,658	(93.1)	893	(90.0)	11,765	(93.3)	<.01
No	938	(6.9)	91	(10.0)	847	(6.7)	

[1] Women considered to have contraceptive need included fecund women who reported not wanting birth within the next 12 months.

Women with contraceptive need (Table 2) composed the majority of the sample (n=12,658, 93.1%, s.e.=0.30). Among these women, 47.8% (s.e.=0.68) were using a modern method of contraception. The proportions of HIV-positive (48.1%, s.e.=2.3) and HIV-negative (47.8%, s.e.=0.69) women using modern methods were not statistically significantly different

(p=0.90). The total proportion of women using a LARC method was 1.9% (s.e.=0.18), with similar proportions of HIV-positive (1.4%, s.e.=0.44) and HIV-negative (1.9%, s.e.=0.19, p=0.35) women using this method of contraception. Progestin-only injection use was high among women with contraceptive need, at 29.4% (s.e.=0.61). HIV-negative women (30.4%, s.e.=0.64) were more likely than HIV-positive women (15.6%, s.e.=1.4) to use progestin-only injections (p<.01). In this sample, 9.8% (s.e.=0.39) women reported female sterilization as their current method of contraception. Use of this method was higher among HIV-positive women (17.9%, s.e.=1.8) than among HIV-negative women (9.2%, s.e.=0.38, p<.01).

Table 2. Contraception use among sexually debuted, non-pregnant women with contraceptive need in Malawi, 2010

			Self-reported HIV status				
	Total (N=12,658)		**HIV Positive (N=893)**		**HIV Negative (N=11,765)**		**P-value**
	Unweighted No.	**Weighted (%)**	**Unweighted No.**	**Weighted (%)**	**Unweighted No.**	**Weighted (%)**	
All types[1]							
Not Using	6106	(48.4)	462	(50.4)	5644	(48.2)	<.01
Female Sterilization	1240	(9.8)	154	(17.9)	1086	(9.2)	
Male Sterilization	7	(0.1)	1	(0.0)	6	(0.1)	
Oral Contraceptive Pill	334	(2.7)	11	(1.3)	323	(2.8)	
Intrauterine Device	25	(0.3)	1	(0.3)	23	(0.3)	
Progestin-only Injection	3655	(29.4)	135	(15.6)	3520	(30.4)	
Dermal Implant	252	(1.6)	16	(1.1)	236	(1.6)	
Male Condom	500	(3.9)	90	(11.2)	410	(3.4)	
Female Condom	14	(0.1)	6	(0.6)	8	(0.1)	
Periodic Abstinence	96	(0.9)	2	(0.1)	94	(1.0)	

Withdrawal	279	(1.8)	9	(1.0)	236	(1.6)	
Other	150	(1.2)	6	(0.4)	144	(1.2)	
Modern method[2]							
Yes	6027	(47.8)	414	(48.1)	5613	(47.8)	0.90
No	6631	(52.2)	479	(51.9)	6152	(52.2)	
LARC method[3]							
Yes	277	(1.9)	17	(1.4)	260	(1.9)	0.35
No	12381	(98.1)	876	(98.6)	11505	(98.1)	
Progestin-only injection method							
Yes	3655	(29.4)	135	(15.6)	3520	(30.4)	<.01
No	9003	(70.6)	758	(84.4)	8245	(69.6)	
Female sterilization							
Yes	1240	(9.8)	154	(17.9)	1086	(9.2)	<.01
No	11418	(90.2)	739	(82.1)	10679	(90.8)	

[1]If more than one method was reported, the highest method in the list was recorded
[2]Modern methods of contraception include pill, IUD, injections, diaphragm, condom, female sterilization, male sterilization, implants, female condom, foam/jelly, and lactational amenorrhea
[3]Long-acting reversible methods of contraception include intrauterine devices and dermal implants

Prevalence of condom use at last sex, female sterilization, and progestin-only injection use were statistically significantly different by HIV status. Among the analysis population unrestricted by contraceptive need, the adjusted odds (Table 3) of having used a condom at last sex were higher among HIV-positive women compared to HIV-negative women (aOR=7.1, 95% CI, 5.6-9.0). Among the 12,658 women with contraceptive need, the adjusted odds of being sterilized were higher among HIV-positive women than among HIV-negative women (aOR=1.5, 95% CI, 1.1-2.1). In this same population, among HIV-positive women, the adjusted odds of

using progestin-only injections were 0.6 times the odds of HIV-negative women (95% CI, 0.5-0.7).

Table 3. Association between types of contraception and self-reported HIV status

	Progestin-only injection		Female sterilization		Condom use at last sex	
	aOR*	(95% CI)	aOR	(95% CI)	aOR	(95% CI)
Self-reported HIV status						
HIV-negative	1.0	-	1.0	-	1.0	-
HIV-positive	0.6	(0.5-0.7)	1.5	(1.1-2.1)	7.1	(5.6-9.0)

*Adjusted odds ratio, adjusting for age, wealth quintile, urban/rural residence, gravidity, and union status

Discussion

According to nationally representative data collected in 2010 in Malawi, about half of women with in Malawi contraceptive need were using a modern method of contraception. Proportions of modern method use did not vary by self-reported HIV status. Few women with contraceptive need used LARC methods, with no difference in use by self-reported HIV status. HIV-positive women were more likely to be sterilized and less likely to be using progestin-only injections than their HIV-negative counterparts. Among all respondents (regardless of contraceptive need), those who reported being HIV-positive were more likely to have used a condom the last time they had sex than those who were HIV-negative. While the odds of using a condom at last sex were higher among HIV-positive women compared with those who were HIV-negative, overall condom use was low. HIV-positive women who are not using condoms and LARC methods of contraception may be at higher risk for both horizontal and vertical transmission of the virus.

Female sterilization utilization was high in the sample, which is consistent with existing estimates of contraception in Malawi.[7] The prevalence of female sterilization in Malawi is much

higher than in the rest of Africa, at about 10%, compared with 2%, respectively.[7] Sterilization prevalence is so low in Africa as a whole due to a range of resource restraints, including lack of a substantial workforce of healthcare providers, poverty, and competing healthcare demands.[17] Like other countries in Africa, Malawi also faces these issues, but the prevalence of female sterilization remains high. This is because of public health programming efforts, which have increased demand for both female sterilization and desire to limit childbearing. Additionally, an enabling environment, public-private agreements, and availability of free mobile outreach services have also contributed to the rise in female sterilization utilization. The present analysis showed that HIV-positive women were much more likely to have been sterilized than HIV-negative women, even after adjusting for multiple factors. To my knowledge, other studies have not determined whether this method of use varied by self-reported status in Malawi.

Limited data is available describing use of the specific contraceptive methods in this analysis by HIV status among women in Malawi or sub-Saharan Africa. Our analysis found that HIV-positive women are more likely to report using condoms than HIV-negative women, which is consistent with another DHS analysis conducted with data from Zambia (2007), Swaziland (2006-2007), and Zimbabwe (2005-2006).[18] The same study found that similar proportions of HIV-negative and HIV-positive women were using modern methods of contraception, which is consistent with our findings. However, the mentioned study did not analyze more specific methods of use aside from this.

Research suggests that women who use DMPA injectables could be at a higher risk for acquiring HIV than their counterparts who use oral contraceptives containing estrogen and progestin or norethisterone enanthate (NET-EN), another form of injectable contraception.[19] Prior MDHS analysis in women aged 15-24 showed that progestin-only injection users had

higher, though non-significant, HIV seroprevalence than non-users.[20] This may be because the previously mentioned study[19] uses an analysis population of women aged 15-24, where this analysis uses women of all ages. Additionally, this study's use of self-reported HIV status, as opposed to laboratory-confirmed status, may account for differing results.

This analysis' strengths include use of a large, representative study population and the use of self-reported HIV status. To my knowledge, no studies have used self-reported HIV status from the 2010 MDHS to describe contraceptive method use. This analysis' use of self-reported HIV status offers a unique glance at the methods of contraception used by a woman and what she believes her HIV status to be, which may be different that her laboratory-confirmed status. The use of self-reported HIV status allows us to estimate the health behavior implications of perceived HIV status. While we cannot confirm a temporal relationship, it is possible that a woman's perceived HIV status may be influencing the current method of contraception she is using. While the unique use of this data is a strength of this analysis, it is also a limitation. Comparisons of laboratory-confirmed HIV status and self-reported status from the 2010 MDHS have shown that the true number of HIV-positive women in the population may be underestimated by self-reports.[21] Self-reported HIV-positive responses may underestimate laboratory-confirmed HIV-positive results for a number of reasons: 1) the respondent was given a false negative result after her last HIV test; 2) the respondent has seroconverted since her last test, though she was HIV-negative at the time of the test; 3) the respondent misreported her HIV status on purpose. However, self-reported data is never entirely reliable, especially in this context, where respondents are asked to disclose personal information to an interviewer.

The present study highlights the need for contraceptive-based interventions to prevent MTCT. Overall LARC use is low in Malawi despite its proven effectiveness at preventing

unplanned pregnancies. While the WHO recommends interventions that utilize contraception to prevent MTCT, only a small number of PMTCT programs in sub-Saharan Africa specifically focus on preventing unplanned pregnancies in HIV-positive women. For HIV-positive women who desire future births, LARCs should be utilized as first-line contraceptive methods to prevent MTCT because they allow HIV-positive women to space births until they can access other PMTCT services such as ARV prophylaxis. LARCs are safe for most women,[11] and acceptance is likely to be high among both clinicians and patients, given the proper education.[14] To ensure the success of these future interventions, further research should attempt to determine the barriers preventing widespread LARC utilization in Malawi.

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